

SZ in the (Old &) New Millennium

Scott Kay

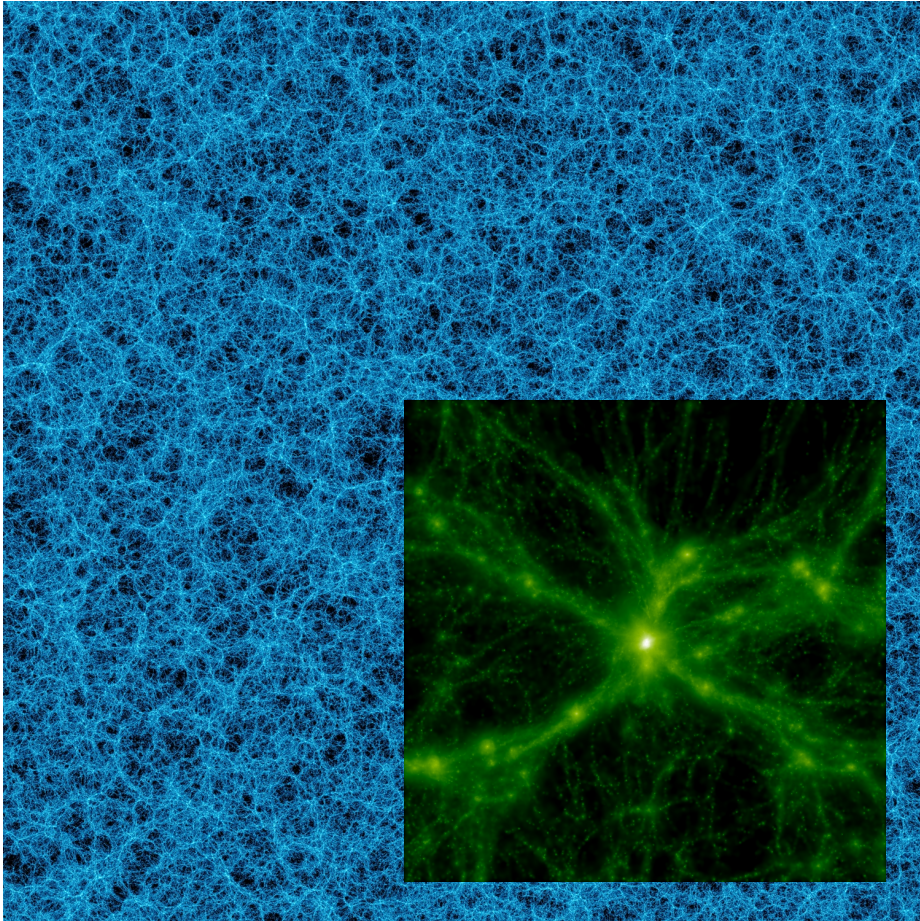
Peter Thomas, Chris Short (Sussex)

Michael Peel, Richard Battye (Manchester)

Owain Young, Andrew Liddle (Sussex)

Frazer Pearce (Nottingham)

Millennium Gas Simulations



Millennium Simulation:

- Tracks CDM only (+SA galaxies)
- $N=2160^3$ particles
- $L=500 h^{-1}\text{Mpc}$ (comoving)
- *WMAP1* cosmology ($\sigma_8=0.9$)

Old Millennium Gas Simulations:

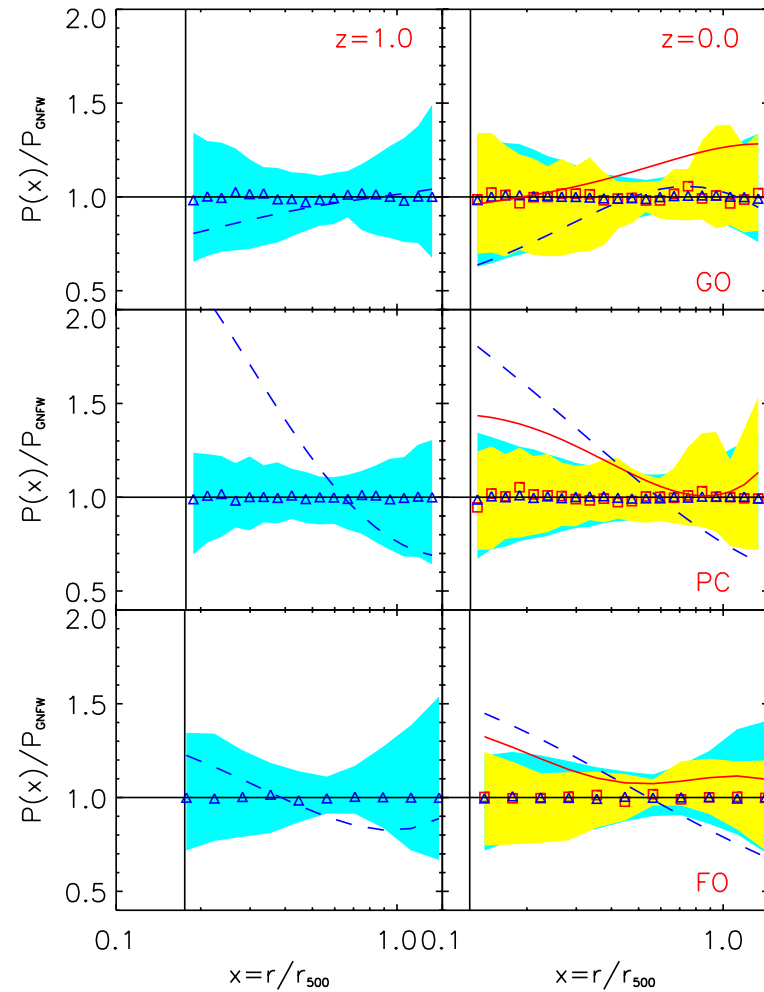
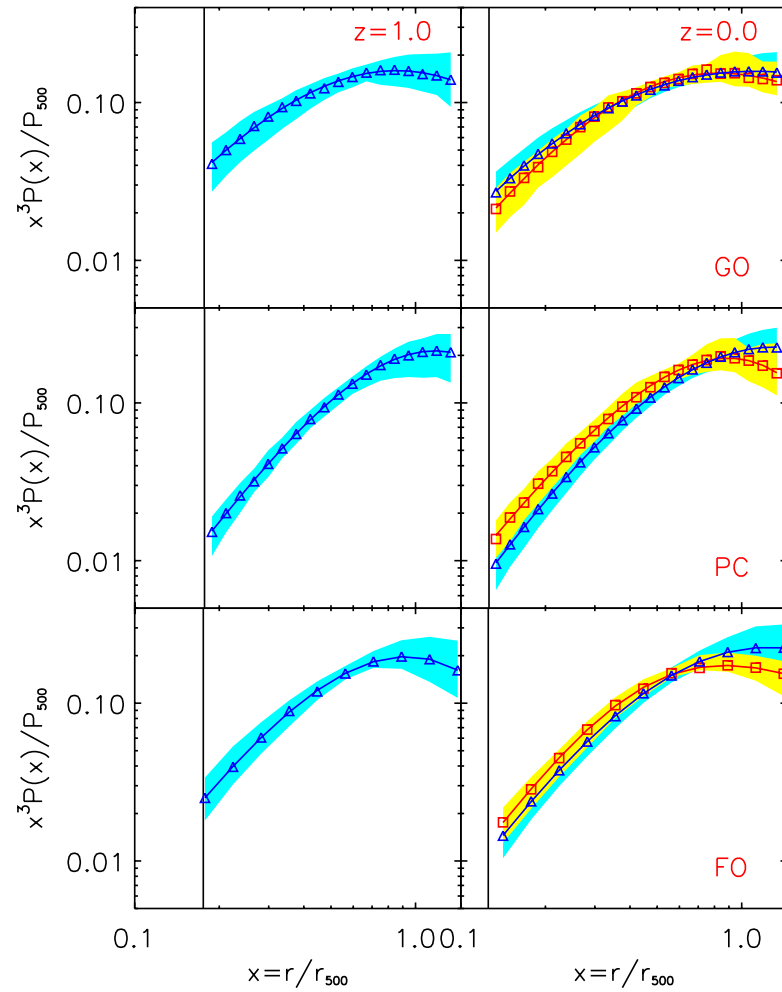
- Same large-scale structure as MS
- Same cosmology as MS
- Fewer (10^9) particles than MS
- **GO** (non-radiative), **PC** (pre-heating +cooling), **FO** (SA feedback) models

New Millennium Gas Simulation:

- Uses *WMAP7* cosmology ($\sigma_8=0.8$)
- New SA model (Guo+11)
- New (SN+AGN) SA feedback model
- MS resolution
- Currently reached $z=0.76$

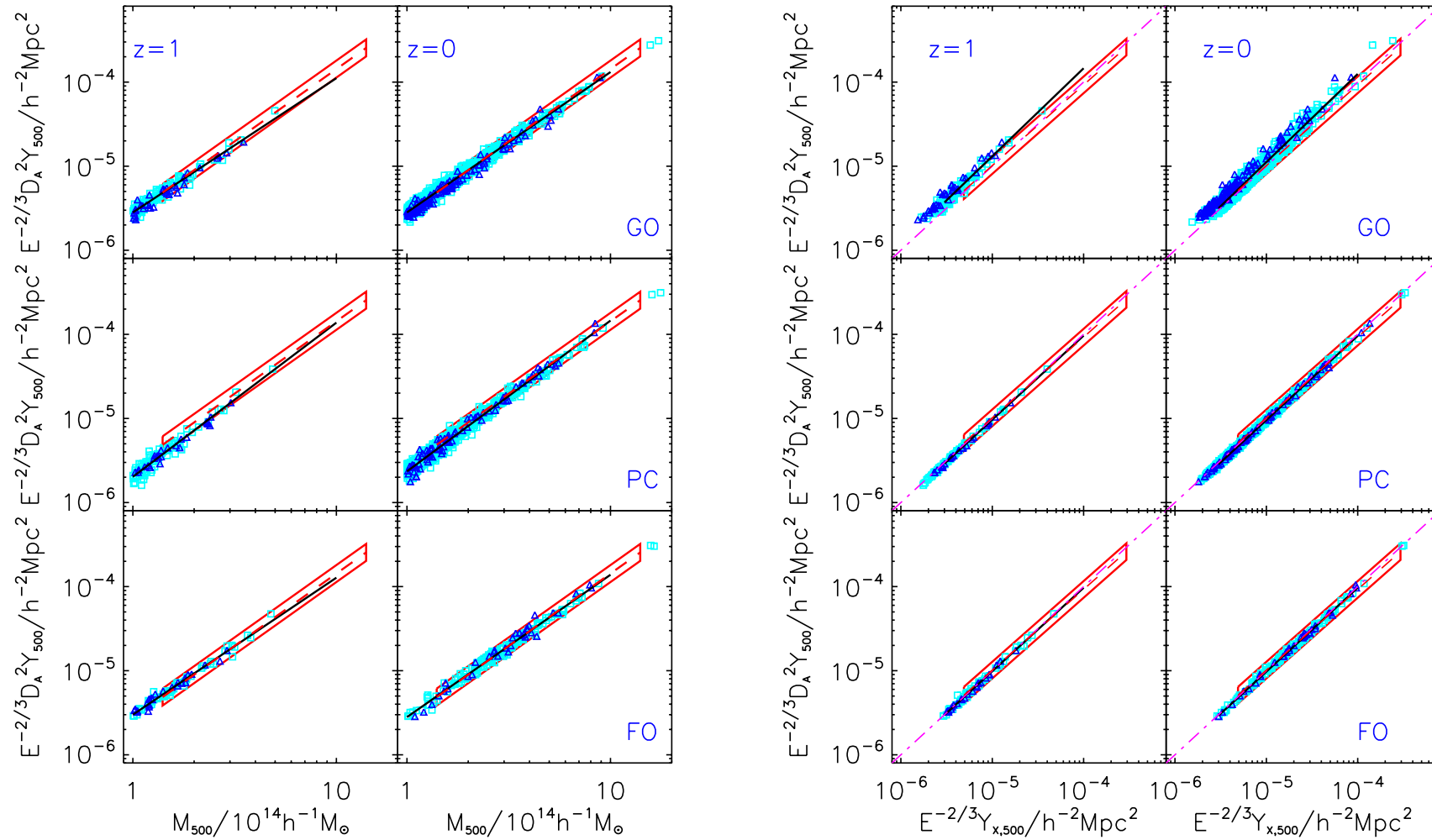
Hot gas pressure profiles

Generalised NFW model, Arnaud et al. profile and scatter

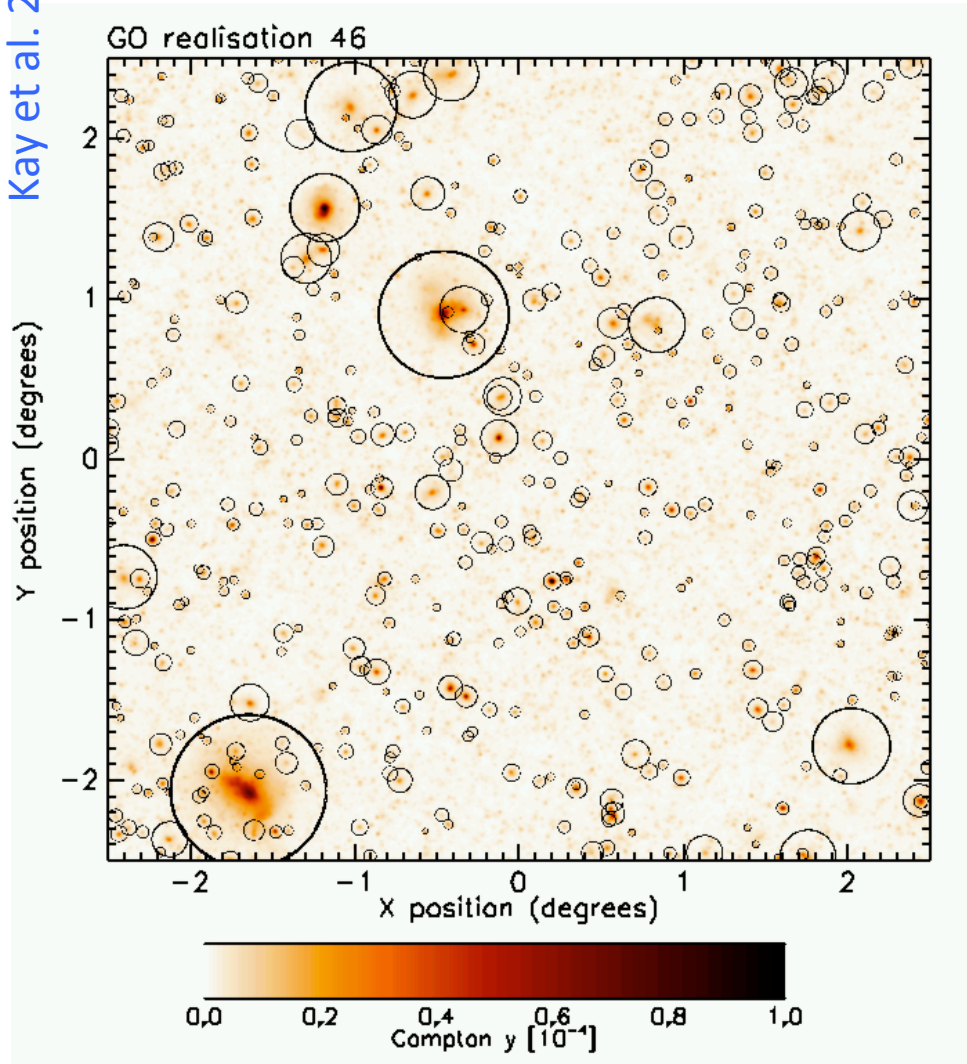


SZ Y_{500} - M_{500} relation

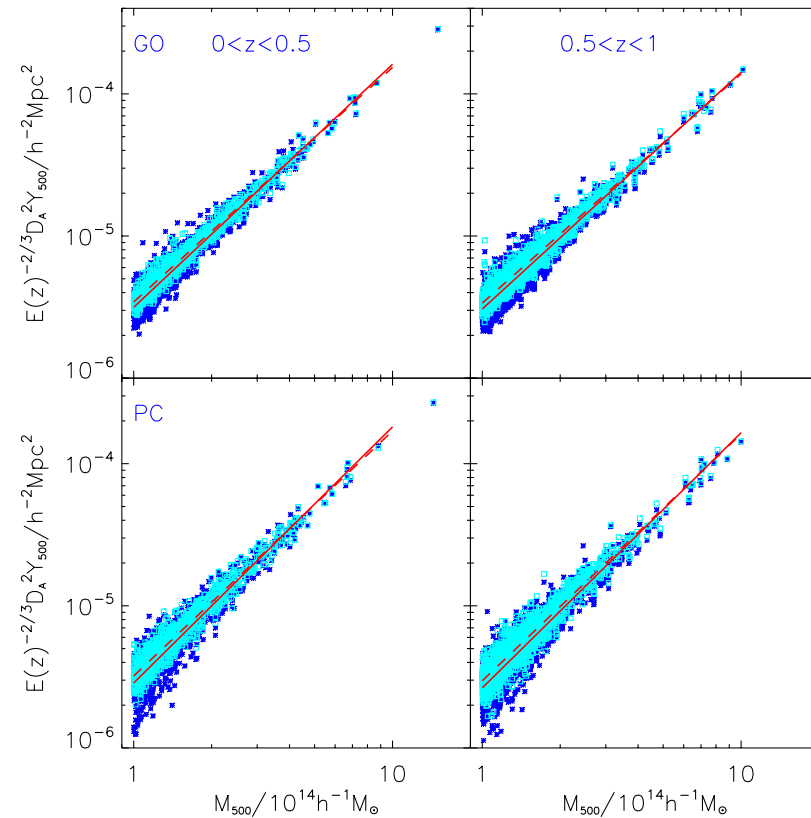
Evolution with redshift and comparison with Planck-XMM data



SZ Y_{500} - M_{500} relation

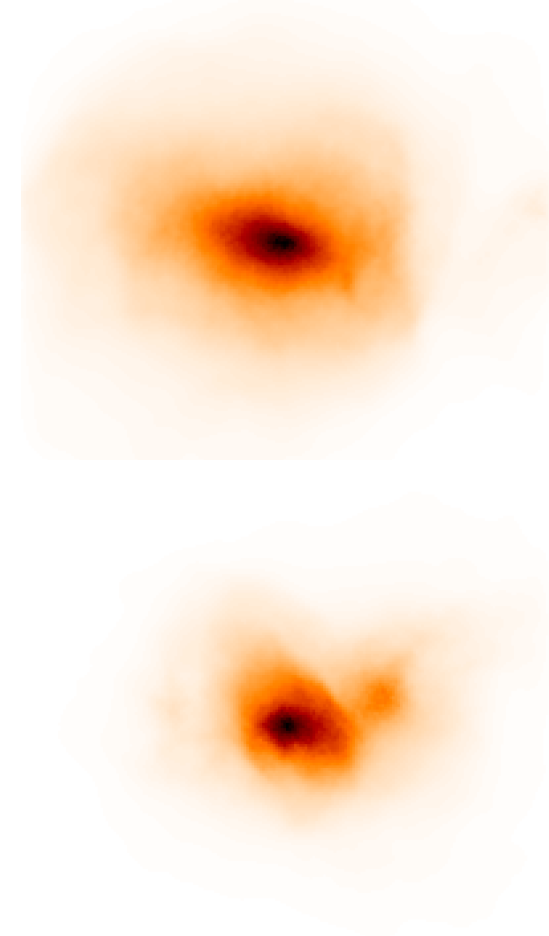
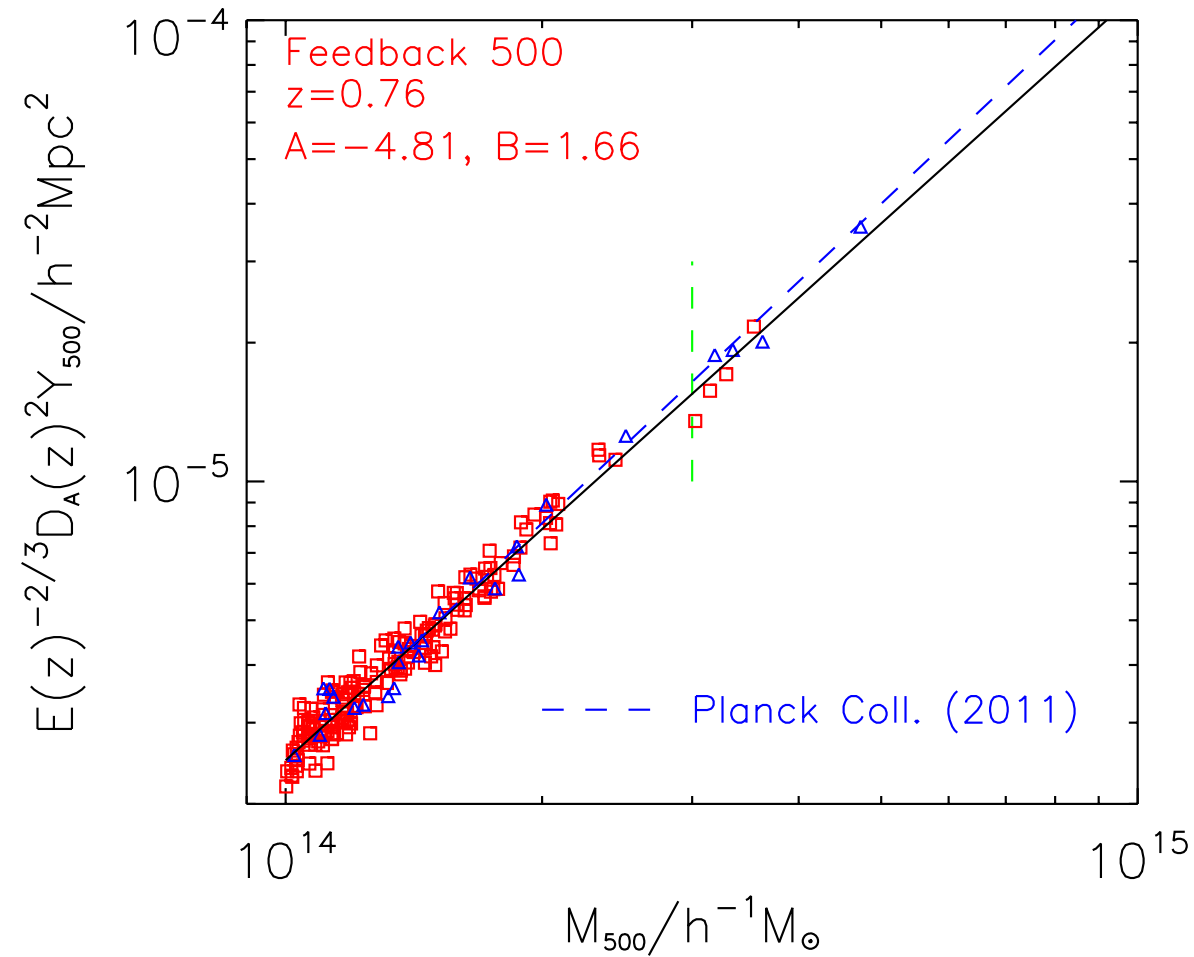


Projected large-scale structure



New Millennium Gas run

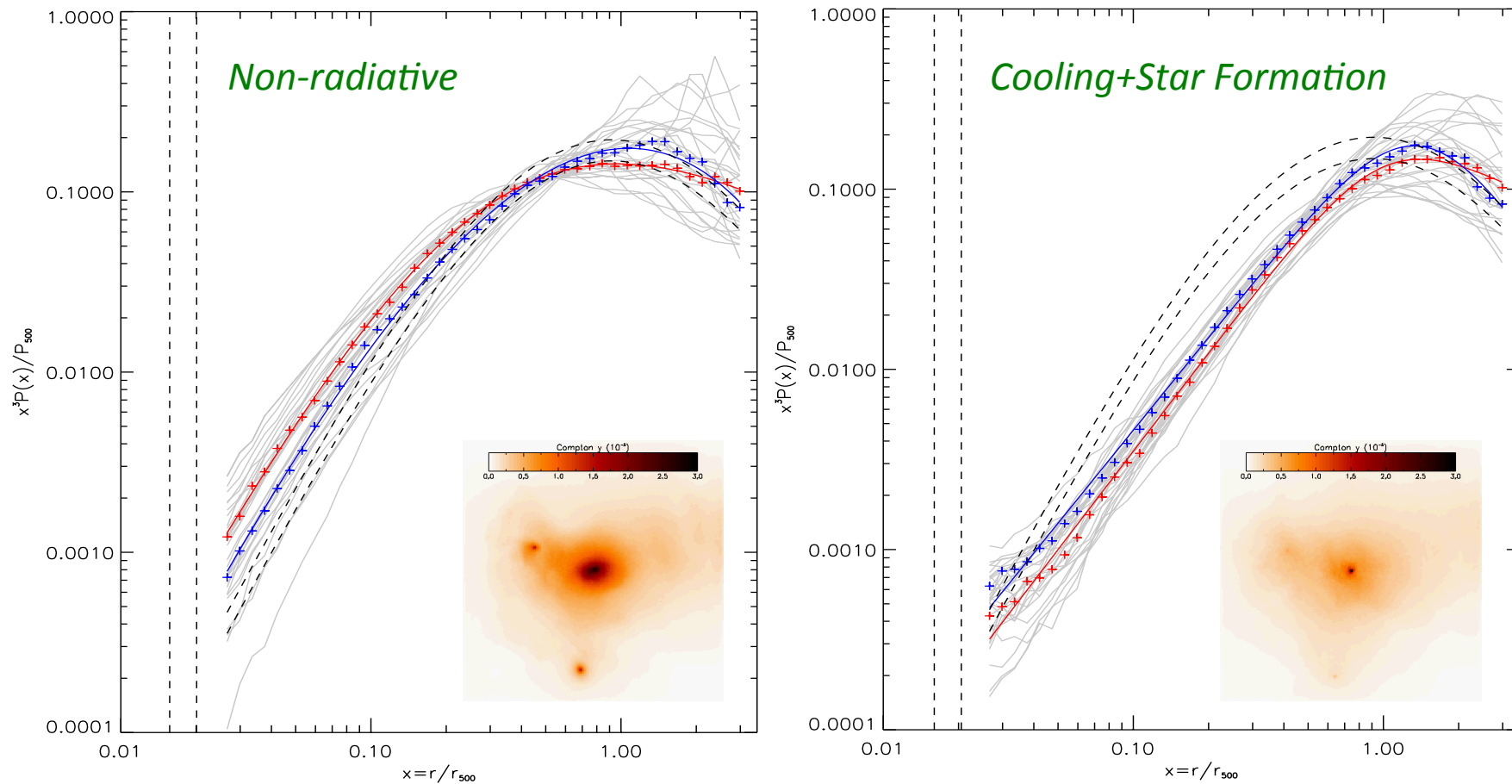
250 Mpc/h box complete; 500 Mpc/h box run to $z=0.76$



Millennium Gas Zoom Simulations

Simon Pike and SK (see poster)

30 clusters, each with $1e6$ DM particles within r_{200}



SN + AGN feedback models in development

SZ Y_{500} - M_{500} relation

Hydrostatic bias and use of Y_x as a mass proxy

